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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/055,811	01/23/2002	Clarbruno Vedruccio	U 013839-0	7403

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EXAMINER	
SODERQUIST, ARLEN	

ART UNIT	PAPER NUMBER
1743	

DATE MAILED: 04/04/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/055,811	VEDRUCCIO, CLARBRUNO	
	Examiner	Art Unit	
	Arlen Soderquist	1743	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 March 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

1. Applicant's request for a new action has been considered with the following result. The finality of the rejection of the last Office action is withdrawn. The rejection has not changed but the Robertson reference applied has been properly cited.

2. Claims 15-17 and 19-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Relative to claim 15, it is not clear what additional structure, if any, would be required for in vitro usage of the device. Relative to claims 16-17, "higher" is a relative term without any comparative basis (e.g. higher than what?). In claim 20 it is not clear if applicant is claiming an apparatus that is only capable of producing and analyzing frequencies that are in the MHz range or that the apparatus has the capability of producing and analyzing those frequencies as a part of the total spectrum of the device. For examination purposes the claims are being treated according to the second scope due to the issue of new matter outlined above. Thus, for examining purposes, a device that produces frequencies in the MHz range will be treated as anticipatory of the claimed device even though it produces frequencies outside of that range. Additionally applicant has not shown that a device can be produced that only produces and analyzes frequencies in the MHz range. See the last paragraph of page 5 and page 4, lines 19-21 relative to the disclosure of the specification being non-limiting relative to the bands of absorption of the radiated field. Additionally, it is noted that the multiples in the paragraph beginning at page 5, line 11 of the instant specification are not limited (see "etc." at the end of the listing). Furthermore it is noted that 900 MHz, 1350 MHz and 1800 MHz are also 0.9 GHz, 1.35 GHz and 1.8 GHz respectively and applicants' own specification fails to limit the frequency bands to the MHz range.

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-2, 4-6, 8 and 14-20 are rejected under 35 U.S.C. 102(b) as being anticipated by Arjavalingam or Robertson (Materials Research Society Symposium Proceedings 1991, previously sent and applied, correct citation currently provided).

In the paper Arjavalingam investigates anisotropic conductivity in stretch-oriented polymers with coherent microwave transient spectroscopy (COMITS). Stretch-oriented and doped polyacetylene and polyaniline are characterized using the coherent microwave transient spectroscopy technique. Conductivities parallel and perpendicular to the direction of elongation are determined. The measured orientation dependence of the sample transmissions is observed to follow the predictions of theory. Figure 1 shows a diagram of the device consisting of a transmitting and receiving antenna with the sample therebetween. The antenna radiate frequencies between 0 and 150 GHz (this inherently covers the MHz range of frequencies) and general details of the process are found in the experimental section. The last sentence of page 6 refers one to other references for additional details of the experimental technique. Figure 2 shows several spectra in which the polymer has a given orientation between the electric field and the stretching direction.

In the paper Robertson discusses broadband microwave dielectric properties of polymers. Coherent microwave transient spectroscopy can be used to determine the complex dielectric properties of materials over a broad frequency range; the technique is based on radiation and detection of picosecond-duration electromagnetic transients by optoelectronically pulsed antennas. The technique is illustrated for a polyimide and a polyamide and doped polyacetylene. The apparatus is shown in figure 1 and is the same as in Arjavalingam. Figure 2 shows a spectrum of the received signal and its Fourier transform (inset showing frequencies in the range of 0-150 GHz). Figure 5 shows several spectra in which the polymer has a given orientation between the electric field and the stretching direction.

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. Claims 3, 7 and 9-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arjavalingam or Robertson as applied to claims 1-2, 4-6 and 8 above, and further in view of Bianco, Fraser, Li, Campbell or Kruger. Arjavalingam or Robertson cover the frequency range but do not investigate biological materials.

In the paper Bianco presents an improved system for microwave spectroscopy of small biological samples. A method is presented to measure the complex dielectric constant of biological liquids in the frequency range 100-2000 MHz. With such measurements, it is possible to obtain useful information about microscopic properties of living matter, with possible diagnostic applications.

In the paper Fraser uses microwave thermography to measure an index of inflamitory joint disease. Microwave thermography is a technique measuring microwave emission from sites of inflammation. Microwaves have a wavelength of around 10 cm are therefore able to penetrate clinically useful depths of up to 4 cm directly measuring tissue thermal radiation. A microwave detector was applied to the study of joint inflammation in rheumatoid arthritis and in a normal control group. Fifty-two knees were scanned using the detector and a microwave thermographic index was calculated for each knee. A strong correlation was found between the microwave thermographic index, and the clinical and laboratory parameters measured. This technique was found to be reproducible, quick, simple to use at the bedside without a controlled environment and, since it measures internally emitted radiation, is inherently safe.

In the paper (see the English abstract) Li presents microwave radiometry in the detection of esophageal cancer. A flow diagram of microwave radiation in layered human tissues was obtained basing on the principles of bioelectromagnetics and biomedical engineering. Some important problems related to the detection of esophageal cancer by Model 846 microwave cancer detector were also studied. As a result, an appropriate method and a set of diagnostic criteria to be processed by microcomputer were obtained. Of 67 cases examined by Model 846 detector, 17 of 21 cases of esophageal cancer were positive, a true positive rate of 81%, while 36 of 46 control cases were negative, a true negative rate of 78.3%. The results indicate that this

method might be of great value in the screening and early diagnosis of esophageal cancer.

In the paper Campbell discusses the dielectric properties of female human breast tissue measured *in-vitro* at 3.2 GHz. Complex permittivities of in vitro diseased and undiseased human female breast tissues have been measured at 3.2 GHz using a resonant cavity technique. Ranges of dielectric properties and water contents of these tissues are presented. Experimental data are compared with models predicted from mixture equations. Measured permittivity data lie within limits set by two-phase mixture theory, but some conductivity data are in excess of those expected for a mixture of saline and protein. At any particular microwave frequency of all tissue of a given type, the relationship between permittivity and conductivity may be parametrized using the Debye relaxation equations. For each breast tissue type a characteristic relaxation frequency was calculated and found to be lower than that of physiological saline at the same temperature. It is concluded that the dielectric relaxation of tissue water is not the only dispersive process occurring at this frequency: dielectric relaxation of bound water and the tail end of a β-dispersion may also contribute to the dielectric properties. The similarity of the dielectric properties of benign and malignant breast tumors measured in this work suggest that in vivo dielectric imaging methods will not be capable of distinguishing them.

In the paper Kruger discusses a medical imaging paradigm related to Thermoacoustic CT with radio waves. The authors evaluated images obtained with a prototypic thermoacoustic computed tomographic (CT) scanner constructed for use at 434 MHz, a promising radio frequency for detecting breast cancer. In one excised porcine kidney, acoustic energy emanating from the kidney was detected with transducers. The resultant electric signals were used to create a three-dimensional data set. Two-dimensional images reconstructed in multiple planes were compared with state-of-the-art T1- and T2-weighted magnetic resonance images. The renal outline, parenchyma, and collecting system were clearly delineated on the thermoacoustic CT images.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to measure biological samples as taught by Bianco, Fraser, Li, Campbell or Kruger at the respective wavelengths taught in the Arjavalingam or Robertson devices because of the ability to measure objects with broadband radiation as taught by Arjavalingam or Robertson and

the desirability of the information available relative to clinical diagnosis at the frequencies of Bianco, Fraser, Li, Campbell and Kruger.

7. Applicant's arguments filed December 14, 2005 have been fully considered but they are not persuasive. Since no new arguments have been provided, the previous response to the arguments of December 14, 2005 have been repeated. Relative to the argument that the instant system is not a pulsed system examiner cannot find language in the instant claims that restrict the claims to a continuous wave device. Thus the argument is not commensurate in scope with the claims and a pulsed system is within the claims. Additionally in the paragraph bridging pages 7-8 of the August 5th response clearly shows that the device format of the two primary references is contemplated to be within the scope of the invention/claims. With regard to the frequencies applied and detected, applicant is directed to the paragraph bridging the two columns of page 6 of the Arjavalingam reference. This paragraph describes how the microwave pulses are produced and measured. In the production of the microwave pulses, optical pulses at a repetition rate of 240 MHz are used to excite the dc-biased transmitter and generate a current pulse that causes electromagnetic radiation to be emitted from the antenna. The radiated electromagnetic pulse induces a transient voltage in the receiver that is sampled. The measured signal has a 7 picosecond wide central peak **containing frequency components between 0 and 150 GHz.** Thus the devices do clearly radiate the samples with radiation in the MHz and microwave range. It is noted that the rejection based on the Robertson reference was previously applied in the rejections mailed June 23, 2005, November 4, 2004 and March 25, 2004, all of the office actions sent to applicant.

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The citation provides the correct citation for the Robertson reference provided with the office action mailed March 25, 2004 and incorrectly identified as found in the journal Electron Letters. Thus applicant has received a copy of the reference and a rejection based on this reference has been applied in each of the rejections that applicant has received form the examiner.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arlen Soderquist whose telephone number is (571) 272-1265. The examiner's schedule is variable between the hours of about 6:30 AM to about 5:00 PM on Monday through Thursday and alternate Fridays.

A general phone number for the organization to which this application is assigned is (571) 272-1700. The fax phone number to file official papers for this application or proceeding is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Arlen Soderquist
Primary Examiner